

Classification, Origin and Distribution of Commensal Rats *

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Commensal rats, of which the black (or roof) rat and the Norway (or brown) rat are the best known and most widely distributed, are derived from wild forms, of which *Rattus rattus* Linnaeus is typical. The wild forms are found in the Malay Peninsula and Archipelago as far east as the Philippines and the Lesser Sunda Islands, in Indochina and China as far as the river Yangtze, but not in the Indian Peninsula except along the Himalayan slope, from where they spread through northern Afghanistan into Russian Turkestan. Split into a great number of local races, the specific group can be divided into five sections of the species *Rattus rattus*. These sections are the *roquei-jalorensis* group, the *neglectus* group, the *brunneus* group, the *hoffmanni* group and the *exulans* group. They are determined by the characters of their skull, by the number and position of their mammae, and by the shape of the spiny hairs in their fur. The geographical distribution of the rats discussed here is shown in Fig. 1-5.

Neither the *brunneus* group of the north nor the *hoffmanni* group of Celebes has developed commensal forms. The *neglectus* group has developed a single commensal with a limited distribution in the Philippines, parts of Celebes, and the Mariana Islands—*Rattus rattus mindanensis* Mearns. The *exulans* group, of which *Rattus rattus wichmanni* Jentink, originally described from the island of Flores, is the wild type, has developed a series of commensals of small size which are found, alongside the larger commensals, in the Malay Peninsula and islands, north as far as Burma, and east all over the islands of the Pacific as far as Hawaii.

The majority of commensal rats has been developed from the wild *Rattus rattus roquei* Sody of Java. This includes both the *rattus* and the *norvegicus* series; the first being derived from the Javan and Malayan domestic rat (*Rattus rattus diardii* Jentink), the second from the field rat (*Rattus rattus argentiventer* Robinson & Kloss), which has developed (or redeveloped) an additional pair of pectoral mammae and in this respect agrees with the Norway rat, although its skull can hardly be distinguished from the wild *roquei* and the domestic *diardii*. Both the *roquei-diardii-rattus* series and the *argentiventer-*

norvegicus series now have an almost world-wide range, although the *rattus* (black rat) series is generally more southern, the *norvegicus* (brown rat) series more northern in distribution. In the tropics, *norvegicus* is found sporadically, and only along the coast in cities, never far inland. For instance, it is found in Bombay but not in Delhi, in Capetown but not in Pretoria or Johannesburg, in Mombasa but not in Nairobi.

The *rattus* series of commensals contains indoor, domestic commensals with grey belly, and white-bellied outdoor peridomestic commensals which have become segregated from the original stock. No white-bellied commensals are found in the Malay area, where the appropriate ecological niche is occupied by the wild forms.

Rats of the black rat group, both grey-bellied and white-bellied, are the common rats on ships, where the impossibility of segregation has produced mixed populations. The Norway rat is uncommon on ships, but does become ship-borne occasionally, which explains its occurrence in harbours all over the world. The small Polynesian rat (*exulans*) has been spread by native boats into the Pacific.

It should be pointed out here that the grey-bellied domestic commensals are the most important contacts for human plague. The white-bellied peridomestic commensals and the *norvegicus* series maintain the contact between infected domestic commensals and human plague on the one hand and the wild animal reservoirs—i.e., the sylvatic (animal) type of plague—on the other.

The mammary formulae of the different types occurring in the *Rattus rattus* group are as follows:

1. All wild forms of the *roquei-jalorensis* and *neglectus* groups and all white-bellied and grey-bellied commensals derived from them: 2 (pectoral)—3 (abdominal) pairs=total 10 mammae.
2. All commensals of the *norvegicus* series: 3-3=12 (last pectoral pair removed from second).
3. All wild and commensal forms of the *exulans* group: 2-2=8.
4. *Rattus rattus hoffmanni* group (wild): 1-3=8
5. *Rattus rattus brunneus* group (wild): 3-3=12 (last pectoral pair close to second).

* Note submitted to the WHO Expert Committee on Plague, September 1958.

FIG. 1
DISTRIBUTION OF WILD RAT FORMS



FIG. 2
DISTRIBUTION OF WHITE-BELLIED COMMENSAL RATS

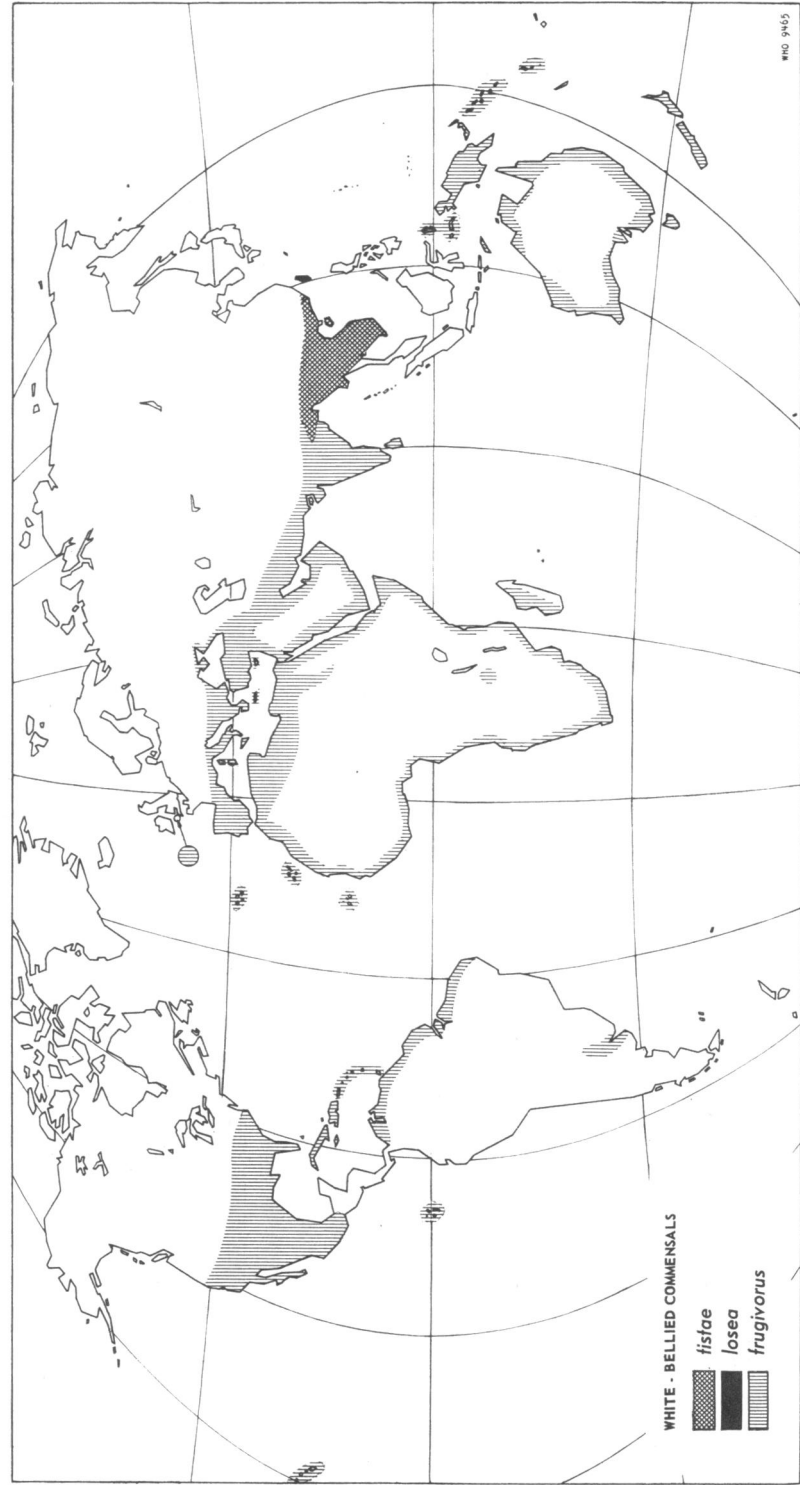


FIG. 3
DISTRIBUTION OF GREY-BELLIED COMMENSAL RATS

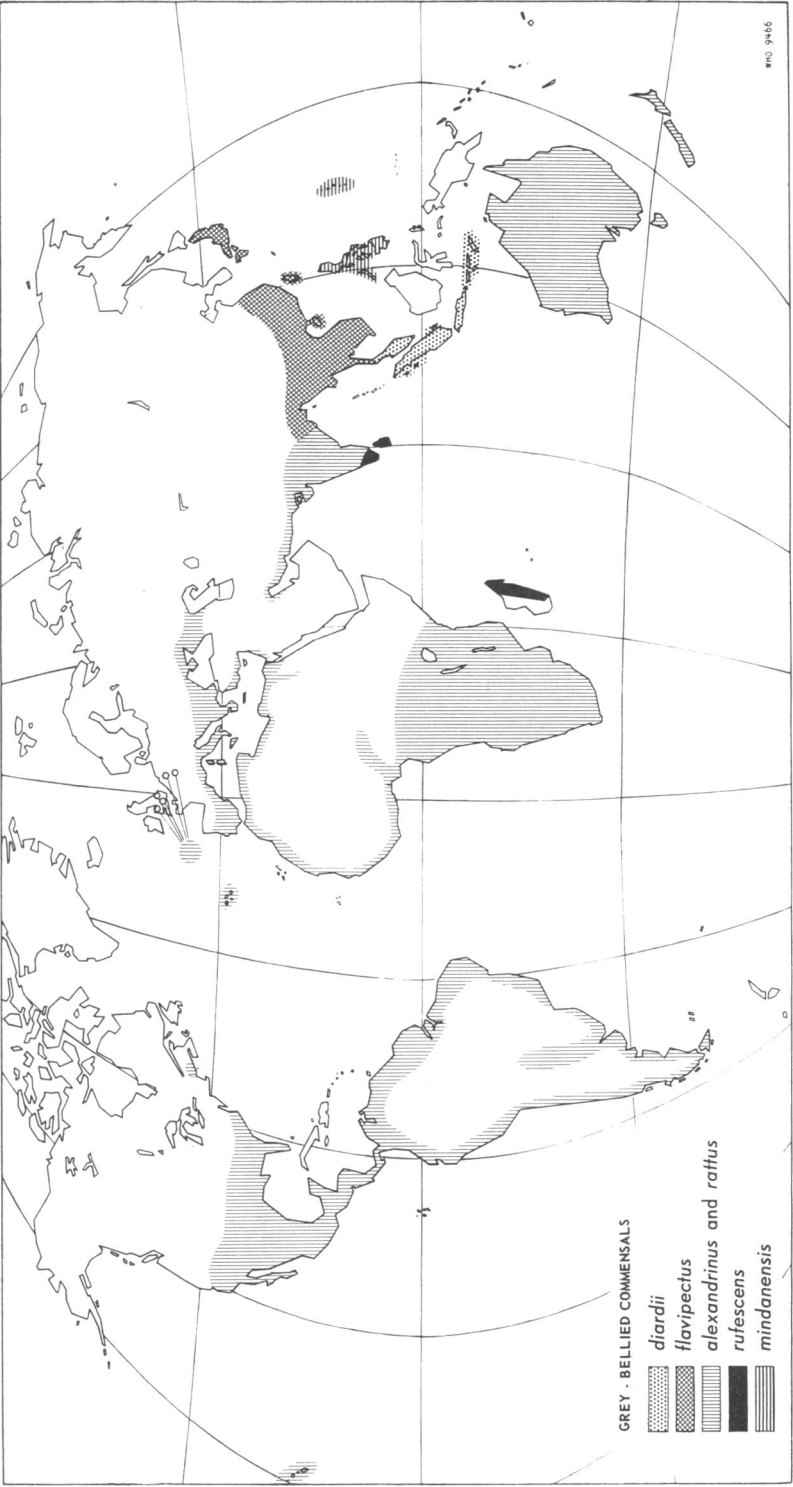


FIG. 4
DISTRIBUTION OF COMMENSAL RATS OF THE NORWAY GROUP

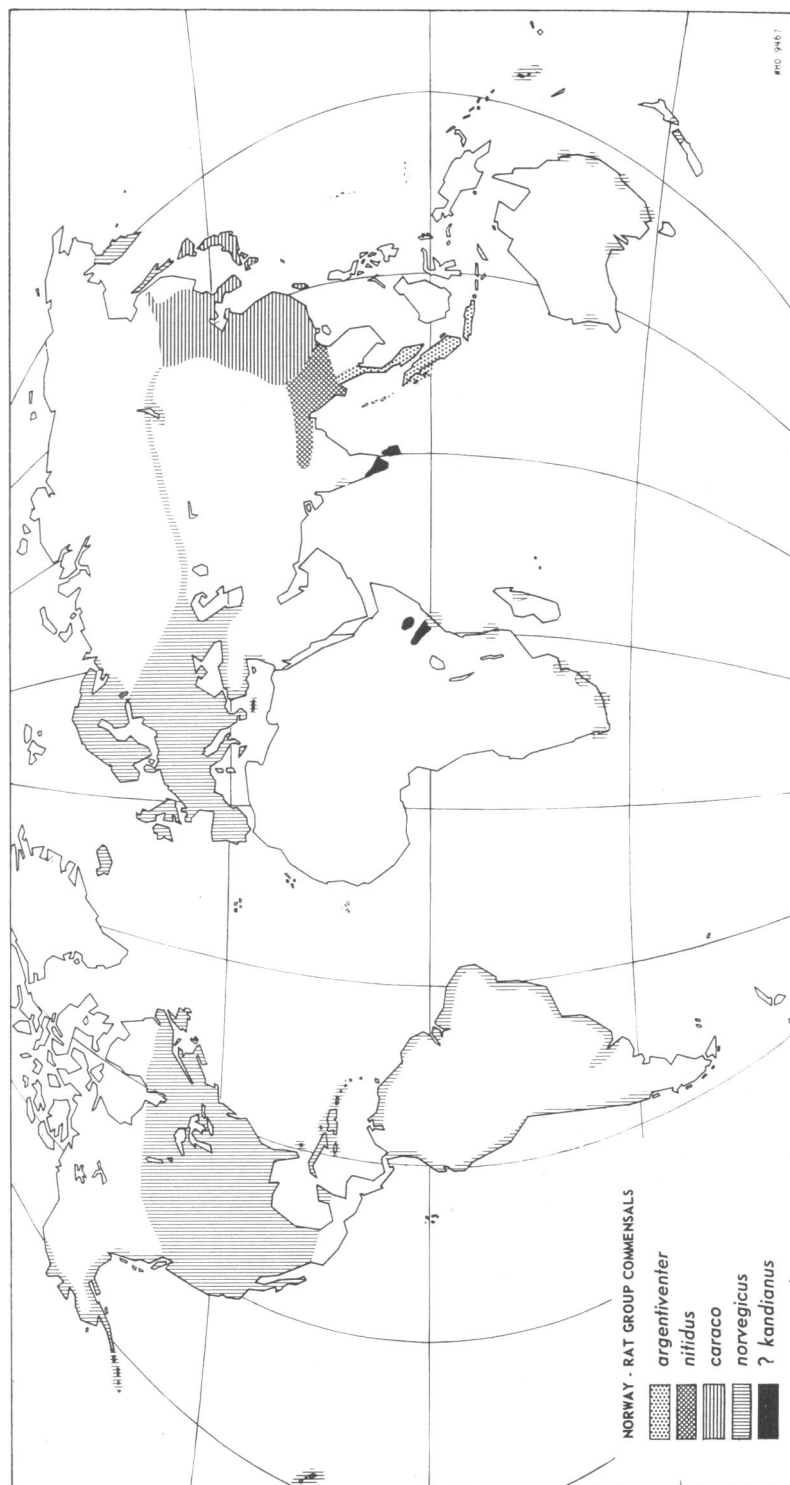


FIG. 5
DISTRIBUTION OF POLYNESIAN SMALL COMMENSAL RATS

